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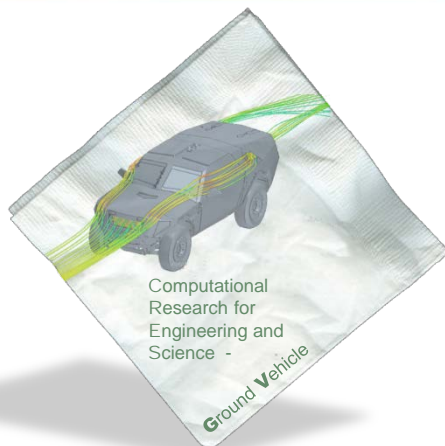
**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

## CRES-GV Overview

Computational Research for Engineering and Science — Ground Vehicles

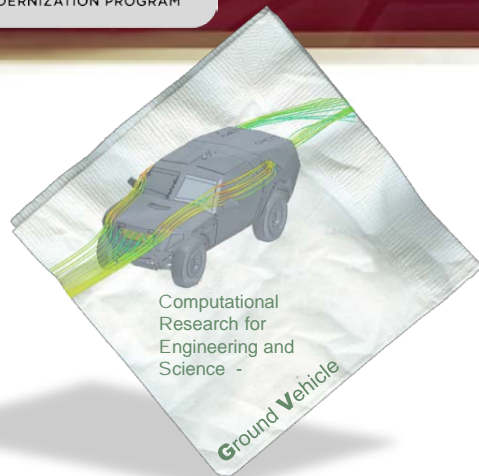
15 June 2012

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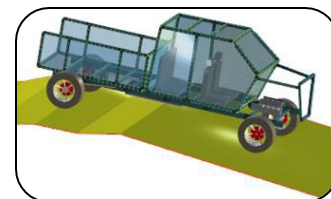
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- New HPCMP project
- **Goal: Physics-based M&S to substantially improve the acquisition process and results**
- HPC = faster design, test, innovation loop
- Accelerate solution exploration
- Eliminate fragile point designs

### Preliminary Product Ideas:

1. **Mixed-Fidelity Multidisciplinary Physics Solver Suite**
  - Fast answer with less model preparation.
  - Capable of sustained 72 hour turnaround
2. **Optimization Tool**
  - Focus on robustness optimization, not point solution
3. **High-Level Systems Tradespace Tool**
  - GTRI / Ricardo type tool: "Collaborative Visualization"
4. **Concept Definition Tool**
  - Pre detail-design CAD w/ physics
5. **Improved Soldier-in-the-loop "Try it Before You Buy It"**

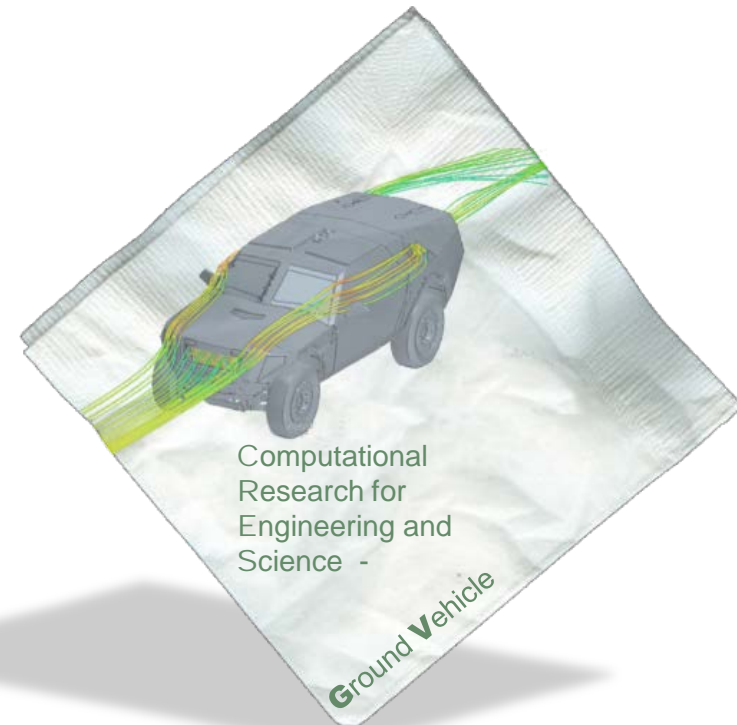


CMTS – Detailed CAD not necessary for up-front design and analysis



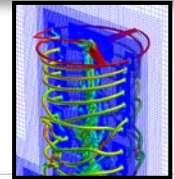
Ride motion simulators greatly enhance soldier-centric design

- HPCMO is the major funding source and proponent
- FY 12 for PM buy-in / initial planning with ERDC
- HPCMO to fund at higher level in out years
  - Contractors to write commercial-quality code
  - Possibly upgrade commercial codes
- Team thus far:
  - TARDEC Lead: Rob Smith
  - ERDC Lead: Randy Jones
  - Dan Kedziorek (HPC)
  - Russ Kouba (Concepts)
  - Pradeep Mendonza (Systems)





- Computational Research and Engineering Acquisition Tools and Environments (**CREATE**) Program
- Air Vehicles (AV)—Air Force, Army & Navy
  - Aerodynamics, structural mechanics, propulsion, control, ...
- Ships—Navy
  - Shock vulnerability, hydrodynamics, concept design
- Radio Frequency (RF) Antennas—Air Force, Army & Navy
  - RF Antenna electromagnetics and integration with platforms
- Mesh and Geometry (MG) Generation
  - Rapid generation of mesh and geometry representations needed by analysis



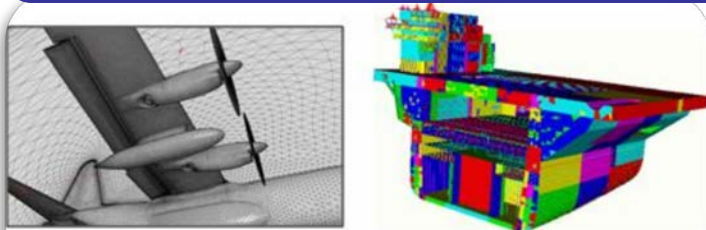
Design concept



Seakeeping and resistance



Shock vulnerability



Aircraft and aircraft carrier meshes



Military platforms with antennas

*CREATE tools will support all stages of acquisition from rapid early stage design to full life-cycle sustainment*

**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

## Goal: Knowledge Based Acquisition



## Ground Vehicle CRES



**ASEC S.E. Tool Captures and Drives Process**

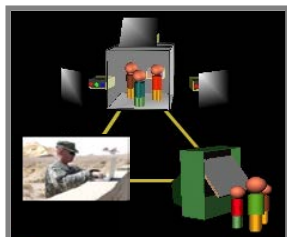


**Quick Turnaround Physics- Based M&S**



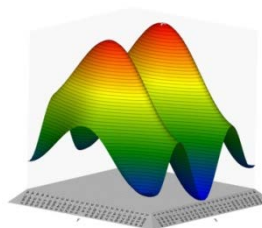
**Operational Models based on accurate data = Better requirements**

### Intuitive Concepting / Massive Collaboration



- BETTER Concepting CAD "3-D Back of the napkin"
- Users co-design with physics-based feedback

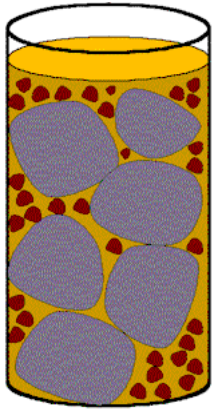
### Better Designsapce Exploration



### Soldier-in-the-loop

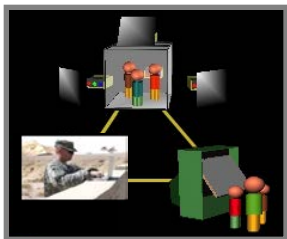
- Duty Cycle Characterization
- Key to Soldier Centric Design



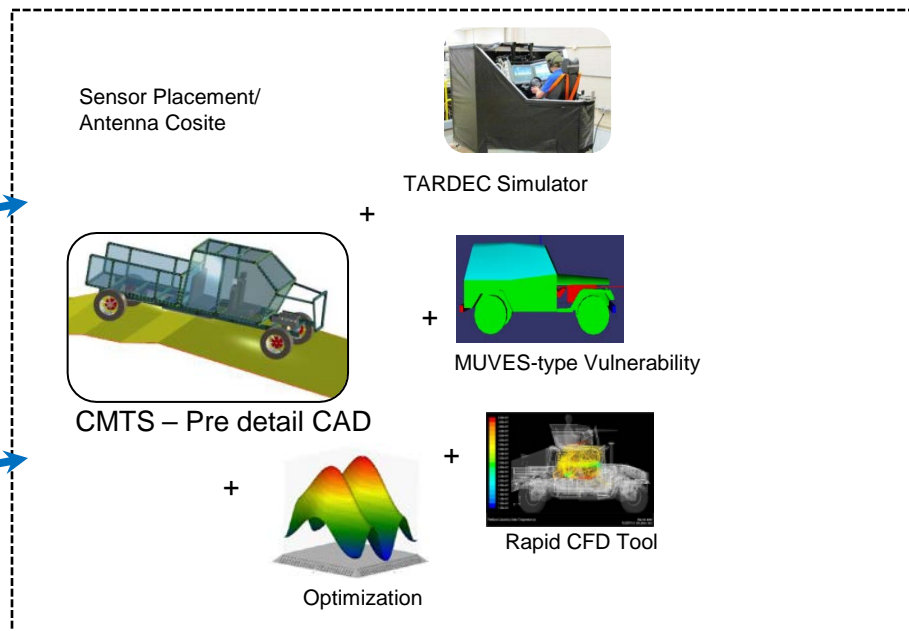


- Powertrain
- Survivability (blast, penetration, MUVES)
- Thermal
- Antenna/ sensor placement / EMI
- Duty cycles/ human factors
- Mobility & Vehicle dynamics (and weapon system)
- Stress / fatigue

## Intuitive Concepting / Massive Collaboration

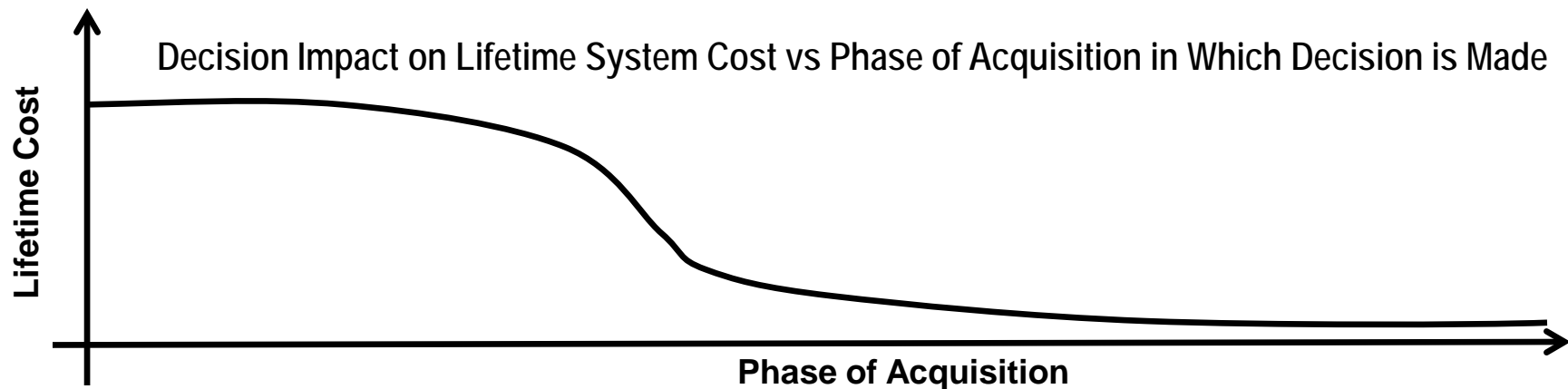
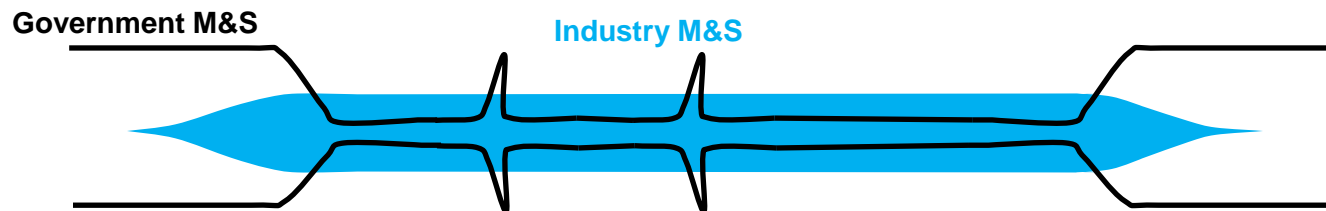
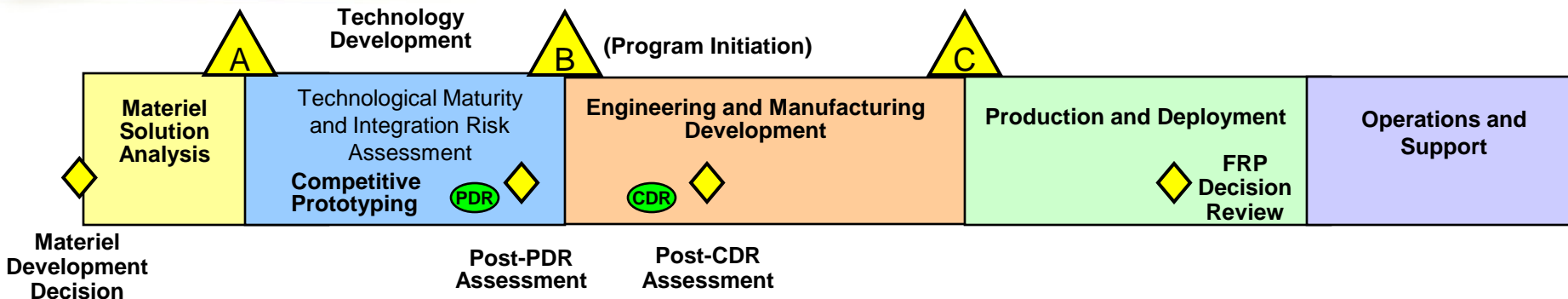


GTRI COVE





# How Address Government vs OEM?



# How Address Government vs OEM?

